Shelling Out: The Origins of Money

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Abstract

The precursors of money, along with language, enabled early modern humans to solve problems of cooperation that other animals cannot – including problems of reciprocal altruism, kin altruism, and the mitigation of aggression. These precursors shared with non-fiat currencies very specific characteristics – they were not merely symbolic or decorative objects.

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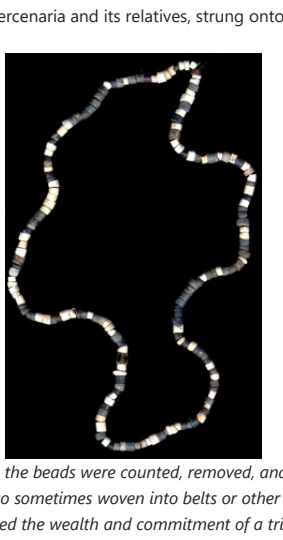
Money

From the very start, England's 17th century colonies in America had a problem – a shortage of coins[D94][T01] The British idea was to grow large amounts of tobacco, cut timber for the ships of their global navy and merchant marine, and so forth, sending in return the supplies they felt were needed to keep the Americans working. In effect, early colonists were supposed to both work for the company and shop at the company store. The investors and the Crown much preferred this to paying in coin what the farmers might ask, letting the farmers themselves buy the supplies – and, heaven forbid, keep some of the profit as well.

The colonists' solution was at hand, but it took a few years for them to recognize it. The natives had money, but it was very different from the money Europeans were used to. American Indians had been using money for millenia, and quite useful money it turned out to be for the newly arrived Europeans – despite the prejudice among some that only metal with the faces of their political leaders stamped on it constituted real money. Worse, the New England natives used neither silver nor gold. Instead, they used the most appropriate money to be found in their environment – durable skeleton parts of their prey. Specifically, they used wampum, shells of the clam venus mercenaria and its relatives, strung onto pendants.



Necklace of wampum. During trade the beads were counted, removed, and re-assembled on new necklaces. Native American shell beads were also sometimes woven into belts or other mnemonic and ceremonial devices that demonstrated the wealth and commitment of a tribe to a treaty.

Clams were found only at the ocean, but wampum traded far inland. Sea-shell money of a variety of types could be found in tribes across the American continent. The Iriquois managed to collect the largest wampum treasure of any tribe, without venturing anywhere near the clam's habitat.[D94] Only a handful of tribes, such as the Narragansetts, specialized in manufacturing wampum, while hundreds of other tribes, many of them hunter-gatherers, used it. Wampum pendants came in a variety of lengths, with the number of beads proportional to the length. Pendants could be cut or joined to form a pendant of length equal to the price paid.

Once they got over their hangup about what constitutes real money, the colonists went wild trading for and with wampum. Clams entered the American vernacular as another way to say "money". The Dutch governor of New Amsterdam (now New York) took out a large loan from an English-American bank – in wampum. After a while the British authorities were forced to go along. So between 1637 and 1661, wampum became legal tender in New England. Colonists now had a liquid medium of exchange, and trade in the colonies flourished.[D94]

The beginning of the end of wampum came when the British started shipping more coin to the Americas, and Europeans started applying their mass-manufacturing techniques. By 1661, British authorities had thrown in the towel, and decided it would pay in coin of the realm – which being real gold and silver, and its minting audited and branded by the Crown, had even better monetary qualities than shells. In that year wampum ceased to be legal tender in New England. In 1710 briefly became legal tender in North Carolina. It continued to be used as a medium of exchange, in some cases into the 20th century – but its value had been inflated one hundred fold by Western harvesting and manufacturing techniques, and it gradually went the route that gold and silver jewelry had gone in the West after the invention of coinage – from well crafted money to decoration. The American language of shell money became a quaint holdover – "a hundred clams" became "a hundred dollars". "Shelling out" came to mean paying in coins or bills, and eventually by check or credit card.[D94] Little did we know that we had touched the very origins of our species.

Collectibles

Native American money took many forms besides shells. Furs, teeth, and a variety of other objects with properties we will discuss below were also commonly used as media of exchange. 12,000 years ago, in what is now Washington state, the Clovis people developed some marvelously long chert blades. The only problem – they break far too easily. They were useless for cutting. The flints were being made "for the sheer enjoyment" – or for some other purpose that had nothing to do with cutting.[G01] As we shall see, this seeming frivolity was, quite likely, actually very important to their survival.

Native Americans had not, however, been the first to make artful but useless blades, nor had they invented shell money. Nor, for that matter, had Europeans, even though they, too, in ages past had widely used shells and teeth for money – not to mention cattle, gold, silver, weapons, and much else. Asians had used all that and faux axes issued by governments to boot, but they as well imported this institution. For archaeologists have found pendants of shells dating to the early Paleolithic that could easily have substituted for Native American money.

Beads made from shells of the pea-sized snail Nassarius kraussianus, that lived in a nearby estuary. Blombos Cave, South Africa, 75,000 B.P.[B04]

In the late 1990s archaeologist Stanley Ambrose discovered, in a rock-shelter in the Rift Valley of Kenya, a cache of beads made of ostrich eggshell, blanks, and shell fragments. They are dated using the argon-argon (40Ar/39Ar) ratio to at least 40,000 years old[A98]. Pierced animal teeth have been found in Spain also dating to this time.[W95] Perforated shells have also been recovered from early Paleolithic sites in Lebanon[G95]. Recently regular shells, prepared as strung beads and dating further back still, to 75,000 BP, have been found in Blombos Cave in South Africa.[B04]

Ostrich-eggshell beads, Kenya Rift Valley, 40,000 B.P. (Courtesy Stanley Ambrose)

Our modern subspecies had migrated to Europe and necklaces of shell and tooth appear there, from 40,000 B.P. onward. Shell and tooth pendants appear in Australia from 30,000 B.P. onward[M93]. In all cases, the work is highly skilled, indicating a practice that probably dates much further back in time. The origin of collecting and decorating is quite likely Africa, the original homeland of the anatomically modern subspecies. Collecting and making necklaces must have had an important selection benefit, since it was costly – manufacture of these shells took a great deal of both skill and time during an era when humans lived constantly on the brink of starvation[C94].

Practically all human cultures, even those that do not engage in substantial trade or that use more modern forms of money, make and enjoy jewelry, and value certain objects more for their artistic or heirloom qualities than for their utility. We humans collect necklaces of shells and other kinds of jewelry – for the sheer enjoyment of it. For the evolutionary psychologists an explanation that humans do something for "the sheer enjoyment of it" is not an explanation at all – but the posing of a problem. Why do so many people find the collection and wearing of jewelry enjoyable? For the evolutionary psychologist, this question becomes – what caused this pleasure to evolve?

Detail of necklace from a burial at Sungir, Russia, 28,000 BP. Interlocking and interchangeable beads. Each mammoth ivory bead may have required one to two hours of labor to manufacture.[W97]

Evolution, Cooperation, and Collectibles

Evolutionary psychology starts with a key mathematical discovery of John Maynard Smith[D89]. Using models of populations of co-evolving genes, from the well-developed area of population genetics, Smith posited genes that can code for strategies, good or bad, used in simple strategic problems (the "games" of game theory). Smith proved that these genes, competing to be propagated into future generations, will evolve strategies that are Nash equilibria to the strategic problems presented by the competition. These games include the prisoner's dilemma, a prototypical problem of cooperation, and hawk/dove, a prototypical problem of aggression and its mitigation.

Critical to Smith's theory is that these strategic games, while played out between phenotypes proximately, are in fact games between genes at the ultimate level – the level of competition to be propagated. The genes – not necessarily the individuals – influence behavior as if they were boundedly rational (coding for strategies as optimal as possible, within the limits of what phenotypes can express given the biological raw materials and previous evolutionary history) and "selfish" (to use Richard Dawkins' metaphor). Genetic influences on behavior are adaptations to the social problems presented by genes competing through their phenotypes. Smith called these evolved Nash equilibria evolutionary stable strategies.

The "epicycles" built on top of the earlier individual selection theory, such as sexual selection and kin selection, disappear into this more general model which, in a Copernican manner, puts the genes rather than individuals at the center of the theory. Thus Dawkins' metaphorical and often misunderstood phrase, "selfish gene", to describe Smith's theory.

Few other species cooperate on the order of even Paleolithic humans. In some cases – brood care, the colonies of ants, termites, and bees, and so forth, animals cooperate because they are kin – because they can help copies of their "selfish genes" found in their kin. In some highly constrained cases, there is also ongoing cooperation between non-kin, which evolutionary psychologists call reciprocal altruism. As Dawkins describes it[D89], unless an exchange of favors is simultaneous (and sometimes even then), one party or the other can cheat. And they usually do. This is the typical result of a game theorists call the Prisoner's Dilemma – if both parties cooperated, both would be better off, but if one cheats, he gains at the expense of the sucker. In a population of cheaters and suckers, the cheaters always win. However, sometimes animals come to cooperate through repeated interactions and a strategy called Tit-for-Tat: start cooperating and keep cooperating until the other party cheats – then defect yourself. This threat of retaliation motivates continued cooperation.

The situations where such cooperation in fact occurs in the animal world are highly constrained. The main constraint is that such cooperation is restricted to relationships where at least one of the participants is more or less forced to be in the proximity of the other. The most common case is when parasites, and hosts whose bodies they share, evolve into symbiotes. If the interests of the parasite and the host coincide, so that both working together would be more fit than either on their own, (i.e. the parasite is also providing some benefit to the host), then, if they can play a successful game of Tit-for-Tat, they will evolve into symbiosis – a state where their interests, and especially the exit mechanism of genes from one generation to the next, coincides. They become as a single organism. However, there is much more than cooperation going on here – there is also exploitation. They occur simultaneously. The situation is analogous to an institution humans would develop – tribute – which we will analyze below.

Some very special instances occur that do not involve parasite and host sharing the same body and evolving into symbiotes. Rather, they involve non-kin animals and highly constrained territory. A prominent example Dawkins describes are cleaner fish. These fish swim in and out of the mouths of their hosts, eating the bacteria there, benefiting the host fish. The host fish could cheat – it could wait for the cleaner to finish its job, then eat it. But they don't. Since they are both mobile, they are both potentially free to leave the relationship. However, the cleaner fish have evolved a very strong sense of individual territoriality, and have stripes and dances that are difficult to spoof – much like a difficult to forge brand logo. So the host fish know where to go to get cleaned – and they know that if they cheat, they will have to start over again with a new distrustful cleaner fish. The entrance costs, and thus the exit costs, of the relationship are high, so that it works out without cheating. Besides, the cleaner fish are tiny, so the benefit of eating them is not large compared to the benefit of a small number of, or even one, cleaning.

One of the most pertinent examples is the vampire bat. As their name suggests, they suck the blood of prey mammals. The interesting thing is that, on a good night, they bring back a surplus; on a bad night, nothing. Their dark business is highly unpredictable. As a result, the lucky (or skilled) bats often share blood with the less lucky (or skilled) bats in their cave. They vomit up the blood and the grateful recipient eats it.

The vast majority of these recipients are kin. Out of 110 such regurgitations witnessed by the strong-stomached biologist G.S. Wilkinson, 77 were cases of mothers feeding their children, and most of the other cases also involved genetic kin. There were, however, a small number that could not be explained by kin altruism. To demonstrate these were cases of reciprocal altruism, Wilkinson combined the populations of bats from two different groups. Bats, with very rare exception, only fed old friends from their original group.[D89] Such cooperation requires building a long-term relationship, where partners interact often, recognize each other, and keep track of each other's behavior. The bat cave helps constrain the bats into long-term relationships where such bonds can form.

We will see that some humans, too, chose highly risky and discontinuous prey items, and shared the resulting surpluses with non-kin. Indeed, they accomplished this to a far greater extent than the vampire bat. How they did so is the main subject of our essay. Dawkins suggests, "money is a formal token of delayed reciprocal altruism", but then pursues this fascinating idea no further. We will.

Among small human groups, public reputation can supercede retaliation by a single individual to motivate cooperation in delayed reciprocation. However, reputational beliefs can suffer from two major kinds of errors – errors of about which person did what, and errors in appraising the value or damages caused by that act.

The need to remember faces and favors is a major cognitive hurdle, but one that most humans find relatively easy to overcome. Recognizing faces is easy, but remembering that a favor took place when such memory needs to be recalled can be harder. Remembering the specifics about a favor that gave it a certain value to the favored is harder still. Avoiding disputes and misunderstandings can be improbable or prohibitively difficult.

The appraisal or value measurement problem is very broad. For humans it comes into play in any system of exchange – reciprocation of favors, barter, money, credit, employment, or purchase in a market. It is important in extortion, taxation, tribute, and the setting of judicial penalties. It is even important in reciprocal altruism in animals. Consider monkeys exchanging favors – say pieces of fruit for back scratches. Mutual grooming can remove ticks and fleas that an individual can't see or reach. But just how much grooming versus how many pieces of fruit constitutes a reciprocation that both sides will consider to be "fair", or in other words not a defection? Is twenty minutes of backscratching worth one piece of fruit or two? And how big a piece?

Even the simple case of trading blood for blood is more complicated than it seems. Just how do the bats estimate the value of blood they have received? Do they estimate the value of a favor by weight, by bulk, by taste, by its ability to satiate hunger, or other variables? Just the same, measurement complications arise even in the simple monkey exchange of "you scratch my back and I'll scratch yours".

For the vast majority of potential exchanges, the measurement problem is intractable for animals. Even more than the easier problem of remembering faces and matching them to favors, the ability of both parties to agree with sufficient accuracy on an estimate of the value of a favor in the first place is probably the main barrier to reciprocal altruism among animals.

Just the stone tool-kit of even early Paleolithic man that has survived for us to find was in some ways too complicated for brains of our size. Keeping track of favors involving them – who manufactured what quality of tool for whom, and therefore who owed whom what, and so on – would have been too difficult outside the boundaries of the clan. Add onto that, quite likely, a large variety of organic objects, ephemeral services (such as grooming), and so on that have not survived. After even a small fraction of these goods had been transferred and services performed our brains, as inflated as they are, could not possibly keep track of who owed what to whom. Today we often write these things down – but Paleolithic man had no writing. If cooperation occurred between clans and even tribes, as the archaeological record indicates in fact occured, the problem gets far worse still, since hunter-gatherer tribes were usually highly antagonistic and mutually distrustful.

If clams can be money, furs can be money, gold can be money, and so on – if money is not just coins or notes issued by a government under legal tender laws, but rather can be a wide variety of objects – then just what is money anyway? And why did humans, often living on the brink of starvation, spend so much time making and enjoying those necklaces when they could have been doing more hunting and gathering? Nineteenth century economist Carl Menger[M1892] first described how money evolves naturally and inevitably from a sufficient volume of commodity barter. In modern economic terms the story is similar to Menger's.

Barter requires a coincidence of interests. Alice grows some pecans and wants some apples; Bob grows apples and want some pecans. They just happen to have their orchards near each other, and Alice just happens to trust Bob enough to wait between pecan harvest time and apple harvest time. Assuming all these conditions are met, barter works pretty well. But if Alice was growing oranges, even if Bob wanted oranges as well as pecans, they'd be out of luck – oranges and apples don 't both grow well in the same climate. If Alice and Bob didn't trust each other, and couldn't find a third party to be a middleman[L94] or enforce a contract, they'd also be out of luck.

Further complications could arise. Alice and Bob can't fully articulate a promise to sell pecans or apples in the future, because, among other possibilities, Alice could keep the best pecans to herself (and Bob the best apples), giving the other the dregs. Comparing the qualities as well as the quantities of two different kinds of goods is all the more difficult when the state of one of the goods is only a memory. Furthermore, neither can anticipate events such as a bad harvest. These complications greatly add to the problem of Alice and Bob deciding whether separated reciprocal altruism has truly been reciprocal. These kinds of complications increase the greater the time interval and uncertainty between the original transaction and the reciprocation.

A related problem is that, as engineers would say, barter "doesn't scale". Barter works well at small volumes but becomes increasingly costly at large volumes, until it becomes too costly to be worth the effort. If there are n goods and services to be traded, a barter market requires **n^2** prices. Five products would require twenty-five prices, which is not too bad, but 500 products would require 250,000 prices, which is far beyond what is practical for one person to keep track of. With money, there are only **n** prices – 500 products, 500 prices. Money for this purpose can work either as a medium of exchange or simply as a standard of value – as long as the number of money prices themselves do not grow too large to memorize or change too often. (The latter problem, along with an implicit insurance "contract", along with the lack of a competitive market may explain why prices were often set by long-evolved custom rather than proximate negotiation).

Barter requires, in other words, coincidences of supply or skills, preferences, time, and low transaction costs. Its cost increases far faster than the growth in the number of goods traded. Barter certainly works much better than no trade at all, and has been widely practiced. But it is quite limited compared to trade with money.

Primitive money existed long before large scale trade networks. Money had an even earlier and more important use. Money greatly improved the workings of even small barter networks by greatly reducing the need for credit. Simultaneous coincidence of preference was far rarer than coincidences across long spans of time. With money Alice could gather for Bob during the ripening of the blueberries this month, and Bob hunt for Alice during the migration of the mammoth herds six months later, without either having to keep track of who owed who, or trust the other's memory or honesty. A mother's much greater investment in child rearing could be secured by gifts of unforgeable valuables. Money converts the division of labor problem from a prisoner's dilemma into a simple swap.

The proto-money used by many hunter-gatherer tribes looks very different from modern money, now serves a different role in our modern culture, and had a function probably limited to small trade networks and other local institutions discussed below. I will thus call such money collectibles instead of money proper. The terms used in the anthropological literature for such objects are usually either "money", defined more broadly than just government printed notes and coins but more narrowly than we will use "collectible" in this essay, or the vague "valuable", which sometimes refers to items that are not collectibles in the sense of this essay. Reasons for choosing the term collectible over other possible names for proto-money will become apparent. Collectibles had very specific attributes. They were not merely symbolic. While the concrete objects and attributes valued as collectible could vary between cultures, they were far from arbitrary. The primary and ultimate evolutionary function of collectibles was as a medium for storing and transferring wealth. Some kinds of collectibles, such as wampum, could be quite functional as money as we moderns know it, where the economic and social conditions encouraged trade. I will occasionally use the terms "proto-money" and "primitive money" interchangeably with "collectible" when discussing pre-coinage media of wealth transfer.

Gains From Wealth Transfers

People, clans or tribes trade voluntarily because both sides believe they gain something. Their beliefs about the value may change after the trade, for example as they gain experience with the good or service. Their beliefs at the time of the trade, although to some degree inaccurate as to the value, are still usually correct as to the existence of gain. Especially in early intertribal trade, restricted to high value items, there was strong incentive for each party to get their beliefs right. Thus trade almost always did benefit both parties. Trade created value as much as the physical act of making something.

Because individuals, clans, and tribes all vary in their preferences, vary in their ability to satisfy these preferences, and vary in the beliefs they have about these skills and preferences and the objects that are consequent of them, there are always gains to be made from trade. Whether the costs of making these trades – transaction costs – are low enough to make the trades worthwhile is another matter. In our civilization, far more trades are possible than were through most of human history. Nevertheless, as we shall see some kinds of trades were worth more than the transaction costs, for some cultures, probably back to the beginning of *homo sapiens sapiens*.

Voluntary spot trades are not the only kinds of transactions that benefit from lower transaction costs. This is the key to understanding the origin and evolution of money. Family heirlooms could be used as collateral to remove the credit risk from delayed exchanges. The ability of a victorious tribe to extract tribute from the vanquished was of great benefit to the victor . The victor's ability to collect tribute benefited from some of the same kinds of transaction cost techniques as did trade. So did the plaintiff in assessment of damages for offenses against custom or law, and kin groups arranging a marriage. Kin also benefited from timely and peaceful gifts of wealth by inheritance. The major human life events that modern cultures segregate from the world of trade benefited no less than trade, and sometimes more so, from techniques that lowered transaction costs. None of these techniques was more effective, important, or early than primitive money – collectibles.

When *H. sapiens sapiens* displaced *H. sapiens neanderthalensis*, population explosions followed. Evidence from the takeover in Europe, c. 40,000 to 35,000 B.P, indicates that *H. sapiens sapiens* increased the carrying capacity of its environment by a factor of ten over *H. sapiens neanderthalensis* – i.e., the population density increased tenfold[C94]. Not only that, the newcomers had spare time to create the world's first art – such as the wonderful cave paintings, a wide variety of well crafted figurines – and of course the wonderful pendants and necklaces of seashells, teeth, and eggshell.

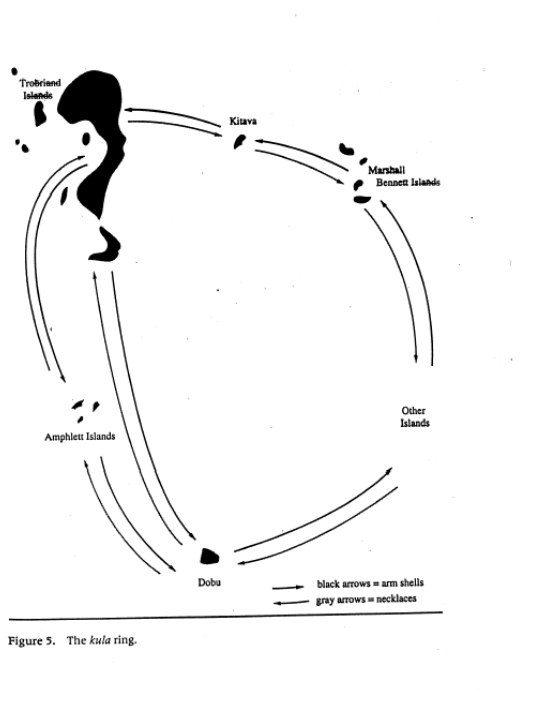
These objects were not useless decorations. Newly effective wealth transfers, made possible by collectibles as well as other probable advance of the era, language, created new cultural institutions that quite likely played the leading role in the increase of carrying capacity.

The newcomers, *H. sapiens sapiens*, had the same size brain, weaker bones, and smaller muscles than the Neanderthals. Their hunting tools were more sophisticated, but in 35,000 B.P. they were basically the same tools – they were probably not even twice as effective, much less ten times more effective. The biggest difference may have been wealth transfers made more effective or even possible by collectibles. *H. sapiens sapiens* took pleasure from collecting shells, making jewelry out of them, showing them off, and trading them. *H. sapiens neanderthalensis* did not. The same dynamic would have been at work, tens of thousands of years earlier, on the Serengeti, when *H. sapiens sapiens* first appeared in that dynamic maelstrom of human evolution, Africa.

We shall describe how collectibles lowered transaction costs in each kind of wealth transfer – in the voluntary free gift of inheritance, in voluntary mutual trade or marriage, and in the involuntary transfers of legal judgments and tribute.

All these kinds of value transfer occurred in many cultures of human prehistory, probably from the beginning of *Homo sapiens sapiens*. The gains to be made, by one or both parties, from these major life event transfers of wealth, were so great that they occurred despite high transaction costs. Compared to modern money, primitive money had a very low velocity – it might be transferred only a handful of times in an average individual's lifetime. Nevertheless, a durable collectible, what today we would call an heirloom, could persist for many generations and added substantial value at each transfer – often making the transfer even possible at all. Tribes therefore often spent large amounts of time on the seemingly frivolous tasks of manufacturing and exploring for the raw materials of jewelry and other collectibles.

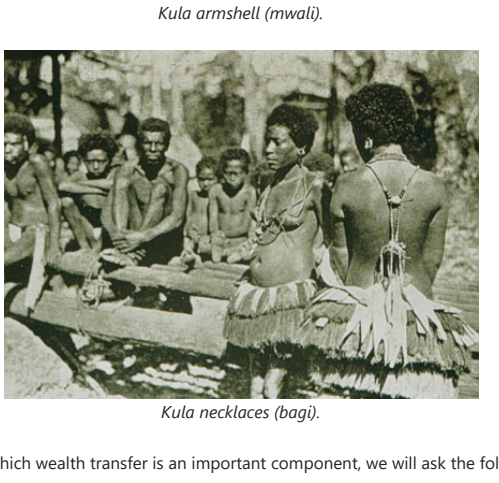
The Kula Ring



The Kula trading network of pre-colonial Melanesia. The kula valuables doubled as "high power" money and mnemonic for stories and gossip. Many of the goods traded, mostly agricultural products, were available in different seasons, and so could not be traded in kind. Kula collectibles solved this double-coincidence problem as an unforgeabaly costly, wearable (for security), and circulated (literally!) money. Necklaces circulated clockwise, and armshells counter-clockwise, in a very regular pattern. By solving the double-coincidence problem an armshell or necklace would prove more valuable than its cost after only a few trades, but could circulate for decades. Gossip and stories that about prior owners of the collectibles further provided information about upstream credit and liquidity. In other Neolithic cultures collectibles, usually shells, circulated in a less regular pattern but had similar purposes and attributes.[L94]

Armband Used in the Kula Exchange
Conus shell, trade beads, seeds, leaf, and fiber
Normandy Island
Papua New Guinea

Kula armshell (mwali).



Kula necklaces (bagi).

For any institution in which wealth transfer is an important component, we will ask the following questions:

1. What coincidence in time between the event, the supply for the transferred good, and demand for the transferred good was necessary? How unlikely or how high a barrier to the wealth transfer did the improbability of coincidence represent?
2. Would the wealth transfers formed a closed loop of collectibles just based on that institution, or were other wealth transfer institutions necessary to complete circulation cycles? Taking the actual flow graph of monetary circulation seriously is critical to understanding the emergence of money. General circulation among a wide variety of trades did not and would not exist for most of human prehistory. Without completed and repeated loops collectibles would not circulate and would become worthless. A collectible, to be worth making, had to add value in enough transactions to amortize its cost.

We shall first examine the kind of transfer most familiar and economically important to us today – trade.

Starvation Insurance

Bruce Winterhalder[W98] surveys models of how and why food is sometimes transferred between animals: tolerated theft, producing/scrounging/opportunism, risk-sensitive subsistence, by-product mutualism, delayed reciprocity, trade/exchange not in kind, and other selection models (including kin altruism). Here we focus on risk-sensitive subsistence, delayed reciprocity, and trade (exchange not in kind). We argue that substituting trade of food for collectibles for delayed reciprocity can increase food sharing. It does so by mitigating the risks of a variable food supply while avoiding the largely insurmountable problems of delayed reciprocity between bands. We will deal with kin altruism and theft (tolerated or not) in broader contexts below.

Food is worth far more to starving people than to well fed ones. If the starving man can save his life by trading his most precious valuables, it may be worth to him months or even years of the labor it might take to replace that value. He will usually consider his life worth more than the sentimental value of the family heirlooms. Like fat itself, collectibles can provide insurance against food shortages. Starvation from local shortages could be staved off with at least two different kinds of trades – for the food itself, or for foraging or hunting rights.

Nevertheless, the transaction costs were usually too high – bands were far more likely to fight than ever trust each other. The hungry band that couldn't find its own food usually starved. However, if the transaction costs could be lowered, by lowering the need for trust between bands, food that was worth a day's labor to one band might be worth several months' labor to the starving band.

Local but extremely valuable trade was, this essay argues, made possible among many cultures by the advent of collectibles, by the time of the Upper Paleolithic. Collectibles substituted for otherwise necessary but non-existent trusting long term relationships. If there had existed a high degree of sustained interaction and trust between tribes, or individuals of different tribes, so that they gave each other unsecured credit, this would have stimulated time-lagged barter trade. However, such a high degree of trust then is highly implausible – for the reasons stated above regarding reciprocal altruism, confirmed by the empirical evidence that most hunter-gatherer tribal relations have been observed to be quite antagonistic. Hunter-gatherer bands usually broke up into small bands for most of the year and gathered into "aggregates", something like medieval European fairs, for a few weeks out of the year. Despite the lack of trust between bands, an important trade in staples, of the kind illustrated in the accompanying figure, almost surely occurred in European and probably elsewhere, such as with the big game hunters of America and Africa.

The scenario illustrated by the accompanying figure is hypothetical, but it would be very surprising if it did not occur. While many Europeans even in the Paleolithic enjoyed wearing shell necklaces, many lived farther inland and made necklaces instead out of the teeth of their prey. Flints, axes, furs, and other collectibles were also quite likely used as media of exchange.

Reindeer, bison, and other human prey migrated at different times of the year. Different tribes specialized in different prey, to the point where over 90%, and sometimes as much as 99%, of the remains from many sites during the Paleolithic in Europe come from a single species[C94]. This indicates at least seasonal specialization and perhaps full-time specialization by a tribe in a single species. To the extent they specialized, the members of a single tribe would have become experts at the behavior, migration habits, and other patterns surrounding their specific prey species, as well as the specialized tools and techniques for hunting them. Some tribes observed in recent times are known to have specialized. Some North American Indian tribes specialized respectively in hunting bison, antelope, and fishing for salmon. In northern Russia and parts of Finland, many tribes, including the Lapp even today, specialized in herding a single species of reindeer.

Such specialization was probably far higher when more large prey (horse, auroch, giant elk, bison, giant sloth, mastodon, mammoth, zebra, elephant, hippopotamus, giraffe, musk oxen, etc.) roamed North America, Europe, and Africa in large herds during the Paleolithic. Large wild animals unafraid of humans no longer exist. During the Paleolithic they were either driven extinct or adapted to be afraid of humans and our projectiles. However, for most of the time span of *H. sapiens sapiens* these herds were abundant and easy pickings to specialist hunters. According to our theory of trade-based predation, specialization was quite likely far higher when large prey roamed North America, Europe, and Africa in large herds during the Paleolithic. Trade-based division of labor in hunting between tribes is consistent with (although not securely confirmed by) the archaeological evidence from the Paleolithic in Europe.

These migrating bands, following their herds, frequently interacted, creating many opportunities for trade. American Indians preserved food by drying, making pemmican, and so on in ways that lasted for a few months but typically not a full year. Such food was commonly traded, along with skins, weapons, and collectibles. Often these trades occurred during annual trading expeditions[T01].

Large herd animals migrated through a territory only two times a year, with a window most often of one or two months. Without any other source of protein besides their own prey species, these specialist tribes would have starved. The very high degree of specialization demonstrated in the archaeological record could only have occurred if there was trade.

Thus, even if the time-offset barter of meat were the only kind of trade, this is quite sufficient to make the use of collectibles quite worthwhile. The necklaces, flints, and any other objects used as money circulate in a closed loop, back and forth, in roughly equal amounts so long as the value of meat traded remains roughly equal. Note that it is not enough, for the theory of collectibles put forth in this paper to be correct, that single beneficial trades were possible. We must identify closed loops of mutually beneficial trades. With closed loops the collectibles continue to circulate, amortizing their costs.

As mentioned, we know from archaeological remains that many tribes specialized in a single large prey species. This specialization was at least seasonal; if there was extensive trade it could have been full-time. Becoming experts in the habits and migration patterns, and best methods of taking down, a tribe reaped enormous productive benefits. These benefits, however, would normally be unattainable, for specializing in a single species meant going without food most of the year. Division of labor between tribes paid off – and trade made it possible. The supply of food would nearly double from trade just between two complementary tribes. There were, however, rather than two prey species, often up to a dozen that migrated through most hunting territories in areas like the Serengeti and the European steppe. The amount of meat available to a species-specializing tribe would thus likely more than double with such trade among a handful of neighboring tribes. On top of this, the extra meat would be there when needed most – when the meat from a tribe's own species prey would already have been eaten, and without food the hunters would starve.

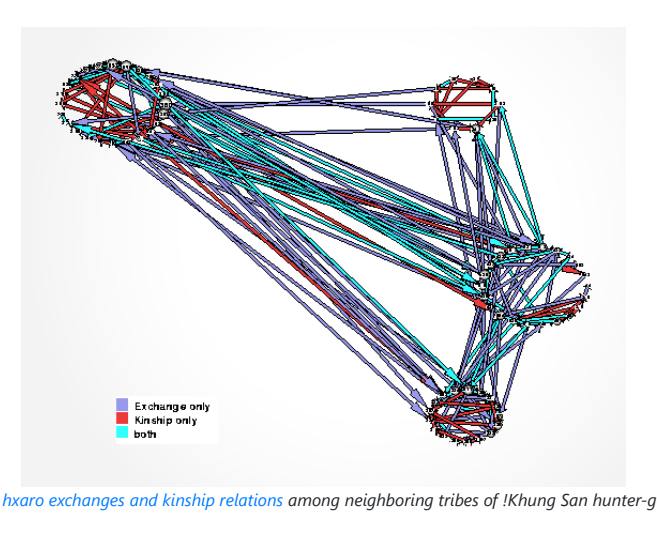
Thus there were at least four gains, or sources of surplus, from a trade cycle as simple as two prey species and two non-simultaneous but offsetting trades. These gains are distinct but not necessarily independent:

1. An available source of meat at a time of the year when one would otherwise starve.
2. An increase in the total supply of meat – they traded the surplus beyond what they could eat immediately or store; what they didn't trade would have gone to waste.
3. An increase in the variety of nutrition from meat, by eating different kinds of meat.
4. Increased productivity from specialization in a single prey species.

Making or saving collectibles to trade for food itself was not the only way to insure against bad times. Perhaps even more common, especially where large prey items were not available, was territoriality combined with trade in foraging rights. This can be observed even in some of the remnants of hunter-gatherer culture that exist today.

The !Kung San of southern Africa, like all other modern remnants of hunter-gatherer cultures, live on marginal lands. They have no opportunity to be specialists but must take the meager remnants available. They may thus be rather uncharacteristic of many ancient hunter-gatherer cultures, and uncharacteristic of the original *Homo sapien sapiens*, which first seized the lushest lands and best game routes from *Homo sapiens neanderthalensis* and only much later drove the Neanderthals from marginal lands. Yet despite their severe ecological handicap, the !Kung use collectibles as items of trade.

Like most hunter-gatherers, the !Kung spend most of the year in small, dispersed bands and a few weeks of the year in an aggregate with several other bands. Aggregation is like a fair with added features – trade is accomplished, alliances are cemented, partnerships strengthened, and marriages transacted. Preparation for aggregation is filled with the manufacture of tradeable items, partly utilitarian but mostly of a collectible nature. The exchange system, called by the !Kung *hxaro*, involves a substantial trade in beaded jewelry, including ostrich-shell pendants quite similar to those found in Africa 40,000 years ago.



Pattern of hxaro exchanges and kinship relations among neighboring tribes of !Khung San hunter-gatherers.

Necklaces used in the hxaro exchange.

One of the main things the !Kung buy and sell with their collectibles are abstract rights to enter another band's territory and hunt or gather food there. Trade in these rights is especially brisk during local shortages which can be alleviated by foraging in a neighbor's territory[W77][W82] !Kung bands mark their territories with arrows; trespassing without having purchased the right to enter and forage is tantamount to a declaration of war. Like the inter-band food trade discussed above, the use of collectibles to purchase foraging rights constitutes an "insurance policy against starvation", to use the phrase of Stanley Ambrose[A98].

Although anatomically modern humans surely had conscious thought, language, and some ability to plan, it would have required little conscious thought or language, and very little planning, to generate trades. It was not necessary that tribe members reasoned out the benefits of anything but a single trade. To create this institution it would have sufficed that people follow their instincts to make obtain collectibles with the characteristics outlined below. (as indicated by proxy observations that make approximate estimations for these characteristics). This is to various extents true of the other institutions we will study – they evolved, rather than being consciously designed. No one participating in the institution's rituals would have explained their function in terms of ultimate evolutionary function; rather they explained in terms of a wide variety of mythologies that served more as proximate motivators of behavior than as theories of ultimate purpose or origin.

Direct evidence for trade in food has long since decayed. We may, in the future, find more direct evidence than is now available for this article, via comparison of hunting remains in one tribe with the consumption patterns in another tribe – the hardest part of this task likely being to identify the boundaries of different tribes or kin groups. According to our theory, such transfer of meat from one tribe to another was common in many parts of the world during the Paleolithic where large-scale and specialized big game hunting occurred.

For now, we do have extensive indirect evidence of trade, via the movement of the collectibles themselves. Fortunately there is a good correlation between the durability desired for collectibles and the conditions under which an artifact has survived to be found by today's archaeologists. In the early Paleolithic, when all human movement was on foot, we have instances of perforated sea shells found up to 500 kilometers away from the nearest source[C94]. There was a similar long-distance movement of flint.

Unfortunately, trade was severely restricted by high transaction costs in most times and places. The primary barrier was the antagonism between tribes. The predominant relationship between tribes was one of distrust on good days and outright violence on bad days. Only ties of marriage or kinship could bring tribes into a relationship with trust, albeit only occasionally and of limited scope. The poor ability to protect property, even collectibles worn on the person or buried in well-hidden caches, meant that collectibles had to amortize their costs in a few transactions.

Trade was thus not the only kind of wealth transfer, and probably not the most important kind during the long human prehistory where high transaction costs prevented the development of the kinds of markets, firms, and other economic institutions we now take for granted[L94]. Underneath our great economic institutions are far more ancient institutions that also involved wealth transfer – in prehistoric times, the main kinds of wealth transfer. All of these institutions distinguished *Homo sapiens sapiens* from previous animals. We now turn to one of the most basic kinds of wealth transfer that we humans take for granted but other animals do not have – passing wealth onto the next generation.

Kin Altruism Beyond the Grave

Coincidence in time and locale of supply and demand for trade was rare – so much so, that most kinds of trades and trade-based economic institutions we now take for granted could not exist. Even more unlikely was the triple coincidence of supply with demand with a major event for a kin group – the formation of a new family, death, crime, or victory or defeat in war. As we shall see, clans, and individuals greatly benefited from a timely transfer of wealth during these events. Such wealth transfer in turn was much less wasteful when it was the transfer of a store of wealth more durable and general than consumables or tools designed for other purposes. The demand for a durable and general store of wealth for use in these institutions was thus even more urgent than for trade itself. Furthermore, the institutions of marriage, inheritance, dispute resolution, and tribute may predate intertribal trade, and involved for most tribes a greater transfer of wealth than trade. These institutions thus more than trade served as the motivator and incubator of the earliest primitive money.

In most hunter-gatherer tribes this wealth came in a form that strikes us preposterously wealthy moderns as trivial – a collection of wooden utensils, flint and bone tools and weapons, shells on strings, perhaps a hut and in colder climates some mangy furs. Sometimes it could all be carried on the person. Nevertheless, these motley assortments were wealth for a hunter-gatherer no less than real estate, stocks, and bonds are wealth for us. To the hunter-gatherer tools and sometimes warm clothes were necessary for survival. Many of the items were highly valued collectibles that insured against starvation, purchased mates, and could substitute for massacre or starvation in event of war and defeat. The ability to transfer the capital of survival to one's descendants was another advantage *Homo sapiens sapiens* had over previous animals. Furthermore, the skilled tribesman or clan could accumulate a surplus of wealth from the occasional, but cumulative over a lifetime, trade of surplus consumables for durable wealth, especially collectibles. A temporary fitness advantage could be translated into a more durable fitness advantage for one's descendants.

Another form of wealth, hidden from the archaeologist, were titles to offices. Such social positions were more valuable than the tangible forms of wealth in many hunter-gatherer cultures. Examples of such positions included clan leaders, war party leaders, hunting party leaders, membership in a particular long-term trading partnership (with a particular person in a neighboring clan or tribe), midwives, and religious healers. Often collectibles not only embodied wealth, but also served as a mnemonic, representing the title to a clan position of responsibility and privilege. Upon death, to maintain order, the heirs to such positions had to be quickly and clearly determined. Delays could spawn vicious conflicts. Thus, a common event was the mortuary feast, in which the deceased was feted while both his tangible and intangible forms of wealth were distributed to descendants, as determined by custom, clan decision-makers, or the will of the deceased.

Other kinds of free gifts were quite rare in pre-modern cultures, as Marcel Mauss[M50] and other anthropologists have pointed out. Seemingly free gifts in fact implicitly invoked an obligation in the recipient. Before contract law, this implicit obligation of the "gift", along with community dishonor and punishments ensuing if the implicit obligation was not met, was perhaps the most common motivator of reciprocation in delayed exchange, and is still common in the variety of informal favors we do for each other. Inheritance and other forms of kin altruism were the only widely practiced forms of what we moderns would call gift proper, namely a gift that imposed no obligation on the recipient.

Early Western traders and missionaries, who often saw natives as childish primitives, sometimes called their tribute payments "gifts" and trades "gift exchanges", as if they bore more resemblance to the Christmas and birthday present exchanges of Western children than to the contractual and tax obligations of adults. Partly this may have reflected prejudice, and partly the fact that in the West by that time obligations were usually formalized in writing which the natives lacked. Westerners thus usually translated the rich variety of words natives had for their exchange institutions, rights, and obligations as "gift". Seventeenth century French settlers in America were thinly scattered among much larger populations of Indian tribes, and often found themselves paying tribute to these tribes. Calling these payments "gifts" was a way for them to save face with other Europeans who faced no such necessity and found it cowardly.

Mauss and modern anthropologists have unfortunately kept this terminology. The uncivilized human is still like a child, but now innocent like a child, a creature of moral superiority who would not stoop to our kind of base, cold-blooded economic transactions. However in the West, especially in the official terminology used for our laws covering transactions, a "gift" refers to a transfer that imposes no obligation. When coming across anthropological discussions of "gift exchange" these caveats should be kept in mind – modern anthropologists are not at all referring to the free or informal gifts we commonly refer to in our modern use on the term "gift". They are rather referring to any of a wide variety of often quite sophisticated systems of rights and obligations involved in wealth transfers. The only major transactions in prehistoric cultures similar to our modern gift, in that it was neither itself a widely recognized obligation nor imposed any obligation on the recipient, were parents or maternal kin caring for their children and inheritance. (An exception was that inheriting title to a position imposed the responsibilities of the position on the heir as well as its privileges).

Inheritance of some heirlooms might proceed for several generations uninterrupted, but it did not by itself form a closed loop of collectibles transfers. Heirlooms were only valuable if they eventually got used for something else. They often were used in marriage transactions between clans that could form closed loop cycles of collectibles.

The Family Trade

An early and important example of a small closed loop trade network made possible by collectibles involves the much higher investment humans make in raising offspring than our primate relatives, and the related human institution of marriage. Combining arrangements of long-term matches for mating and child-raising, negotiated between clans, with wealth transfer, marriage is a human universal and probably dates back to the first *Homo sapiens sapiens*.

Parental investment is a long-term and almost one-shot affair – there is no time for repeated interactions. Divorce from a negligent father or unfaithful wife usually represented several years of time wasted, in genetic fitness terms, by the jilted party. Fidelity and commitment to the children were primarily enforced by in-laws – the clan. The marriage was the contract between clans that usually included such promises of fidelity and commitment as well as wealth transfer.

The contributions a man and a woman will bring to a marriage are seldom equal. This was even more true in an era when mate choice was largely determined by clans and the population from which clan leaders could choose was quite small. Most commonly, the woman was considered more valuable and the groom's clan paid a bride price to the brides clan. Quite rare in comparison was dowry, a payment by the bride's clan to the new couple. Mostly this was practiced by upper classes of monogamous but highly unequal societies in medieval Europe and India, and was ultimately motivated by the far greater reproductive potential of upper class sons than upper class daughters in those societies. Since literature was mostly written about upper classes, dowry often plays a role in European traditional stories. This does not reflect its actual frequency across human cultures – it was quite rare.

Marriages between clans could form a closed cycle of collectibles. Indeed, two clans exchanging partners would be sufficient to maintain a closed loop, as long as brides tended to alternate. If one clan was wealthier in collectibles from some other kind of transfer, it could marry more of its sons to better brides (in monogamous societies) or a greater number of brides (in polygamous societies). In a loop involving only marriages, primitive money would simply serve to replace the need for memory and trust between clans over a long period of delay between unbalanced transfers of reproductive resources.

Like inheritance, lawsuit, and tribute, marriage requires a triple coincidence of the event, in this case the marriage, with supply and demand. Without a transferable and durable store of value, the current ability of a groom's clan to supply the current desires of the bride's clan, to a large enough degree to make up the value mismatch between bride and groom, while also satisfying the political and romantic constraints of the match, were quite unlikely to be well satisfied. One solution is imposing an ongoing service obligation from the groom or his clan to the bride's clan. This occurs in about 15% of known cultures[DW88]. In a much larger number, 67%, the groom or groom's clan pays the brides clan a substantial amount of wealth. Some of this bride price is paid in immediate consumables, in plants to be gathered harvested and animals slaughtered for the marriage feast. In herding or agricultural societies much of the bride price is paid in livestock, a long lasting form of wealth. The balance, and usually the most valuable portion of the bride-price in cultures without livestock, is paid with what are usually the most valuable family heirlooms – the rarest, costliest, and most durable pendants, rings, and so on. The Western practice of the groom giving the bride a ring – and a suitor giving a maiden other kinds of jewelry – was once a substantial transfer of wealth and was common in many other cultures. In about 23% of cultures, mostly modern ones, there is no substantial wealth exchange. In about 6% of cultures there is mutual exchange of substantial wealth between bride and groom clans. In only about 2% of cultures does the bride's clan pay the new couple a dowry.[DW88]

Unfortunately, some wealth transfers were a far cry from the altruism of the inheritance gift or the joy of marriage. Quite the opposite, in the case of tribute.

The Spoils of War

Death rates from violence in chimp troops and hunter-gatherer human cultures alike are far higher than in modern civilizations. This probably dates at least as far back as our common ancestor with the chimpanzees – chimp troops, as well, are constantly fighting.

Warfare involved, among other things, killing, maiming, torture, kidnapping, rape, and the extortion of tribute in exchange for avoiding such fates. When two neighboring tribes were not at war, one was usually paying tribute to the other. Tribute could also serve to bind alliances, achieving economies of scale in warfare. Mostly, it was a form of exploitation more lucrative to the victor than further violence against the defeated.

Victory in war was sometimes followed by an immediate payment from the losers to the winners. Often this just took the form of looting by the enthusiastic victors, while the losers desperately hid their collectibles. More often, tribute was demanded on a regular basis. In this case, the triple coincidence could and sometimes was avoided by a sophisticated schedule of payments in kind that matched the losing tribe's ability to supply a good or service with the victor's demand for it. However, even with this solution primitive money could provide a better way – a common medium of value that greatly simplified the terms of payment – very important in an era when terms of the treaty could not be recorded but had to be memorized. In some cases, as with the wampum as used in the Iriquois Confederacy, the collectibles doubled as a primitive mnemonic device that, while not verbatim, could be used as an aid to recall the terms of the treaty. For the winners, collectibles provided a way to collect tribute at closer to the Laffer optimum. For the losers, collectibles buried in caches provided a way to "under-report", leading the victors to believe the losers were less wealthy and thus demand less than they might. Caches of collectibles also provided insurance against overzealous tribute collectors. Much of the wealth in primitive societies escaped the notice of the missionaries and anthropologists due to its highly secretive nature. Only archeology can reveal the existence of this hidden wealth.

Hiding and other strategies presented a problem that tribute collectors share with modern tax collectors – how to estimate the amount of wealth they can extract. Value measurement is a thorny problem in many kinds of transactions, but never more so than in the antagonistic collection of tax or tribute. In making these very difficult and nonintuitive trade-offs, and then executing them in a series of queries, audits, and collection actions, tribute collectors efficiently optimized their revenue, even if the results seemed quite wasteful to the tribute payer.

Imagine a tribe collecting tribute from several neighbor tribes it previously defeated in war. It must estimate how much it can extract from each tribe. Bad estimates leave the wealth of some tribes understated, while forcing others to pay tribute based on estimates of wealth they don't actually have. The result: the tribes that are hurt tend to shrink. The tribes that benefit pay less tribute than could be extracted. In both cases, less revenue is generated for the victors than they might be able to get with better rules. This is an application of the Laffer curve to the fortunes of specific tribes. On this curve, applied to income taxes by the brilliant economist Arthur Laffer, as the tax rate increases, the amount of revenue increases, but at an increasingly slower rate than the tax rate, due to increased avoidance, evasion, and most of all disincentive to engage in the taxed activity. At a certain rate due to these reasons tax revenues are optimized. Hiking the tax rate beyond the Laffer optimum results in lower rather than higher revenues for the government. Ironically, the Laffer curve was used by advocates for lower taxes, even though it is a theory of tax collection optimum to government revenue, not a theory of tax collection optimal to social welfare or individual preference satisfaction.

On a larger scale, the Laffer curve may be the most important economic law of political history. Charles Adams[A90] uses it to explain the rise and fall of empires. The most successful governments have been implicitly guided by their own incentives – both their short-term desire for revenue and their long-term success against other governments – to optimize their revenues according to the Laffer Curve. Governments that overburdened their taxpayers, such as the Soviet Union and later Roman Empire, ended up on the dust-heap of history, while governments that collected below the optimum were often conquered by their better-funded neighbors. Democratic governments may maintain high tax revenues over historical time by more peaceful means than conquering underfunded states. They are the first states in history with tax revenues so high relative to external threats that they have the luxury of spending most of the money in non-military areas. Their tax regimes have operated closer to the Laffer optimum than those of most previous kinds of governments. (Alternatively, this luxury may be made possible by the efficiency of nuclear weapons in deterring attack rather than the increased incentives of democracies to optimize to tax collection). When we apply the Laffer curve to examining the relative impact of treaty tributterms on various tribes, we conclude that the desire to optimize revenues causes victors to want to accurately measure the income and wealth of the vanquished. Measuring value is crucial to determining the tributaries' incentives to avoid or evade the tribute by hiding wealth, fight, or flight. For their part, tributaries can and do spoof these measurements in various ways, for example by burying collectibles in caches. Tribute collection involves a measurement game with unaligned incentives.

With collectibles, one can demand tribute at strategically optimal times instead of when items can be supplied by the tributary or is in demand by the victor. The victors can then choose when they will in the future consume the wealth, rather than having to consume it at the time the tribute is extracted. Much later, well into the dawn of history, in 700 BC, though trade was widespread, money still took the form of collectibles – made out of more precious metals, but in their basic characteristics, such as lack of uniform value, similar to most of the proto-money used since the dawn of *Homo sapiens sapiens*. This was changed by a Greek-speaking culture in Anatolia (modern Turkey), the Lydians. Specifically, the kings of Lydia were the first major issuers of coins in the archaeological and historical record.

From that day to this, government mints with self-granted monopolies, rather than private mints, have been the main issuers of coin. Why wasn't minting dominated by private interests, such as private bankers, which did exist at the time in these semi-market economies? The main explanation for government dominance of coin minting has been that only governments could enforce anti-counterfeiting measures. However, they could have enforced such measures in protection of competing private mints, just as they enforce trademarks today and at that time as well.

It was far easier to estimate the value of a coin than that of a collectible – especially at low transaction values. Far more trades could be made with money instead of barter; indeed many kinds of low-value trades became possible for the first time as the small gains from trade for the first time exceeded transaction costs. Collectibles were low velocity money, involved in a small number of high value transactions. Coins were high velocity money, facilitating a large number of low value trades.

Given what we have seen about the benefits of proto-money to tribute and tax collectors, as well as the critical nature of the value measurement problem in optimally coercing such payments, it is not surprising that tax collectors, specifically the kings of Lydia, were the first major issuers of coinage. The king, deriving his revenue from tax collection, had a strong incentive to measure to value of wealth held and exchanged by his subjects more accurately. That the exchange also benefited from cheaper measurement by traders of the medium of exchange, creating something closer to efficient markets, and allowing individuals to enter into the marketplace on a larger scale for the first time, was for the king a fortuitous side effect. The greater wealth flowing through markets, now available to be taxed, boosted the king's revenues even beyond the normal Laffer curve effect of reducing mis-measurement between given tax sources.

This combination of more efficient tax collection with more efficient markets meant a vast increase in overall tax revenues. These tax collectors almost literally hit a gold mine, and the wealth of Lydian kings Midas, Croesus, and Giges is famous to this day.

A few centuries later, the Greek king Alexander the Great conquered Egypt, Persia and much of India, funding his spectacular conquest by plundering Egyptian and Persian temples, filled with assemblages of low-velocity collectibles, and melting them down into high-velocity coins. More efficient and encompassing market economies as well as more efficient tax collection sprung up in his wake.

Tribute payments did not form by themselves a closed loop of collectibles. These were only valuable if they ultimately could be used by the victors for something else, such as marriage, trade, or collateral. However, victors could coerce the vanquished into manufacturing for obtaining collectibles, even if it did not serve the vanquished's voluntary interests.

Disputes and Remedies

Ancient hunter-gatherers did not have our modern tort or criminal law, but they did have an analogous means of settling disputes, often judged by clan or tribal leaders or vote, that covered what modern law calls crimes and torts. Settling disputes through punishments or payments sanction by the clans of the disputing parties substituted for cycles of revenge or vendetta wars. Most pre-modern cultures, ranging from the Iriquois in America to the pre-Christian Germanic peoples, decided that payment was better than punishment. Prices (e.g. the Germanic "weregeld" and Iriquois blood money) were assigned to all actionable offenses, ranging from petty theft to rape to murder. Where money was available, the payment took the form of money. Livestock was used in herding cultures. Otherwise, payment of collectibles were the most commonly used remedy.

The payment of remedies for damages in a lawsuit or similar complaint led to the same kind of problem of triple coincidence of event, supply, and demand as occurred in inheritance, marriage, and tribute. The judgment of the case had to coincide with the ability of the plaintiff to pay the damages as well as the opportunity and desire of the defendant to benefit from them. If the remedy was a consumable the plaintiff already had plenty of, the remedy still served as a punishment but would not likely satisfy the defendant – and thus would not curb the cycle of violence. Thus, we here again the value added by collectibles – in this case, in making possible the remedy to resolve a dispute or terminate a cycle of revenge.

Dispute remedies would not form a closed loop if the payments served to entirely eliminate vendettas. However, if the payments did not completely dampen the vendetta, the payments could form a cycle following the cycle of revenge. For this reason, it is possible that the institution reached an equilibrium when it had reduced but not eliminated cycles of revenge until the advent of more densely connected trading networks.

Attributes of Collectibles

Since humans evolved in small, largely self-sufficient, and mutually antagonistic tribes, the use of collectibles to reduce the need for favor-tracking, and to make possible the other human institutions of wealth transfer we have explored, was far more important than the scale problems of barter for most of the timespan of our species. Indeed, collectibles provided a fundamental improvement to the workings of reciprocal altruism, allowing humans to cooperate in ways unavailable to other species. For them, reciprocal altruism is severely limited by unreliable memory. Some other species have large brains, build their own homes, or make and use tools. No other species has produced such an improvement to the workings of reciprocal altruism. The evidence indicates this new development had matured by 40,000 B.P.

Menger called this first money an "intermediate commodity" – what this paper calls collectibles. An artifact useful for other things, such as cutting, could also be used as a collectible. However, once institutions involving wealth transfer became valuable, collectibles would be manufactured just for their collectible properties. What are these properties? For a particular commodity to be chosen as a valuable collectible, it would have had, relative to products less valuable as collectibles, at least the following desirable qualities:

1. More secure from accidental loss and theft. For most of history this meant carriable on the person and easy to hide.
2. Harder to forge its value. An important subset of these are products that are unforgeably costly, and therefore considered valuable, for reasons explained below.
3. This value was more accurately approximated by simple observations or measurements. These observations would have had more reliable integrity yet have been less expensive.

Humans the world over are strongly motivated to collect items that better satisfy these properties. Some of this motivation probably includes genetically evolved instincts. Such objects are collected for the sheer pleasure of collecting them (not for any particularly good explicit and proximate reasons), and such pleasure is nearly universal across human cultures. One of the immediate proximate motivations is decoration. According to Dr. Mary C. Stiner, an archaeologist at the University of Arizona, "Ornamentation is universal among all modern human foragers."[W02] For an evolutionary psychologist, such a behavior that has a good ultimate explanation, in terms of natural selection, but has no proximate rationale other than pleasure, is a prime candidate to be a genetically evolved pleasure that motivates the behavior. Such is, if the reasoning in this essay is correct, the human instinct to collect rare items, art, and especially jewelry.

Point (2) requires some further explanation. At first, the production of a commodity simply because it is costly seems quite wasteful. However, the unforgeably costly commodity repeatedly adds value by enabling beneficial wealth transfers. More of the cost is recouped every time a transaction is made possible or made less expensive. The cost, initially a complete waste, is amortized over many transactions. The monetary value of precious metals is based on this principle. It also applies to collectibles, which are more prized the rarer they are and the less forgeable this rarity is. It also applies where provably skilled or unique human labor is added to the product, as with art.

We have never discovered or made a product that does really well on all three scores. Art and collectibles (in the sense that word is used in modern culture, rather in the technical sense it is used in this paper) optimize (2), but not (1) or (3). Common beads satisfy (1) but not (2) or (3). Jewelry, made at first out of the most beautiful and less common shells but eventually in many cultures out of precious metals, comes closer to satisfying all three properties. It is no coincidence that precious metal jewelry usually came in thin forms such as chains and rings, allowing for inexpensive assaying at randomly chosen locations. Coins were a further improvement – substituting small standard weights and trademarks for assays greatly reduced the costs of small transactions using precious metals. Money proper was just a further step in the evolution of collectibles.

The kind of mobile art also made by Paleolithic man, (small figurines and the like) also matches these characteristics well. Indeed, Paleolithic man made very few objects that were not either utilitarian, or shared characteristics (1)-(3).

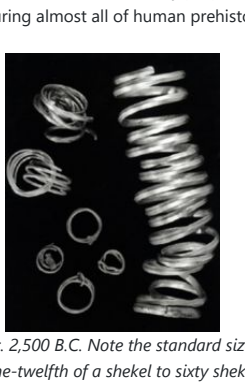
There are many puzzling instances of useless or at least unused flints with *homo sapiens*. We have mentioned the unusable flints of the Clovis people. Culiffe[C94] discusses a European Mesolithic era find of hundreds of flints, carefully crafted, but which micrograph analysis reveals were never used for cutting.

Flints were quite likely the first collectibles, preceding special-purpose collectibles like jewelry. Indeed, the first flint collectibles would have been made for their cutting utility. Their added value as a medium of wealth transfer was a fortuitous side effect that enabled the institutions described in this article to blossom. These institutions, in turn, would have motivated the manufacture of special-purpose collectibles, at first flints that need have no actual use as cutting tools, then the wide variety of other kinds of collectibles that were developed by *Homo sapiens sapiens*.

Shell money from Sumer, c. 3,000 B.C.

During the Neolithic era, in many parts of the Middle East and Europe, some kinds of jewelry became more standardized – to the point where standard sizes and assayability were often valued over beauty. In commercial areas the quantity of this jewelry sometimes greatly exceeded that of traditional jewelry in hoards. This is an intermediate step between jewelry and coins, when some collectibles increasingly took a fungible form. Around 700 B.C., the Lydian kings started issuing coins, as described above. The unforgeable costliness of standard weights of precious metals could now be "assayed" in a marketplace, by wage earners, or by tax collectors via trademark, i.e. trust in the mint's brand, instead of chopping coiled wire at a randomly selected spot.

It is no coincidence that the attributes of collectibles are shared with precious metals, coins, and the reserve commodities that have backed most non-fiat currencies. Money proper implemented these properties a purer form than the collectibles used during almost all of human prehistory.



Silver ring and coil money from Sumer, c. 2,500 B.C. Note the standard size of cross-sections. Many of the pieces had a standard weight, ranging from one-twelfth of a shekel to sixty shekels. To assay a ring or coil, it could be weighed and cut at random locations. (Courtesy Oriental Institute, University of Chicago)

A novelty of the 20th century was the issue of fiat currencies by governments. ("Fiat" means not backed by any reserve commodity, as the gold- and silver-based currencies of previous centuries were). While generally excellent as a media of exchange, fiat currencies have proven to be very poor stores of value. Inflation has destroyed many a "nest egg". It is no coincidence that markets in rare objects and unique artwork – usually sharing the attributes of collectibles described above – have enjoyed a renaissance during the last century. One of our most advanced high-tech marketplaces, EBay, is centered around these objects of primordial economic qualities. The collectibles market is larger than ever, even if the fraction of our wealth invested in them is smaller than when they were crucial to evolutionary success. Collectibles both satisfy our instinctive urges and remain useful in their ancient role as a secure store of value.

Conclusion

Many kinds of wealth transfers – one-way and mutual, voluntary and coerced – face transaction costs. In voluntary trades both parties gain; a truly free gift is usually an act of kin altruism. These transactions create value for one or both parties as much as the physical act of making something. Tribute benefits the victor and a judgment of damages can prevent further violence as well as benefiting the victim. Inheritance made humans the first animals to pass wealth to their next generation kin. These heirlooms could in turn be used as collateral or payment in trade for goods, for food to stave off starvation, or to pay a marriage bride price. Whether the costs of making these transfers – transaction costs – are low enough to make the transfers worthwhile is another matter. Collectibles were crucial in making these kinds of transactions possible for the first time.

Collectibles augmented our large brains and language as solutions to the Prisoner's Dilemma that keeps almost all animals from cooperating via delayed reciprocation with nonkin. Reputational beliefs can suffer from two major kinds of errors – errors of about which person did what, and errors in appraising the value or damages caused by that act. Within clans (the small and immediately local kin group, or extended family, which formed a subset of a tribe), our large brains could minimize these errors, so that public reputation and coercive sanctions superseded the limited motivation provided by the counterparty's ability to cooperate or defect in the future as the main enforcer of delayed reciprocation. In both *Homo sapiens neanderthalensis* and *Homo sapiens sapiens*, with the same large brain size, it is quite likely that every local clan member kept track of everybody other local clan member's favors. The use of collectibles for trade within the small local kin group may have been minimal. Between clans within a tribe both favor tracking and collectibles were used. Between tribes, collectibles entirely replaced reputation as the enforcer of reciprocation, although violence still played a major role in enforcing rights as well as being a high transaction cost that prevented most kinds of trade.

***When costliness becomes forgeable** – Glass trade beads, manufactured in Venice in the 16th or 17th century, excavated from Mali, Africa. Such beads were very popular wherever European colonialists encountered Neolithic or hunter-gatherer cultures.*

To be useful as a general-purpose store of wealth and means of wealth transfer, a collectible had to be embedded in at least one institution with a closed-loop cycle, so that the cost of discovering and/or manufacturing the object was amortized over multiple transactions. Furthermore, a collectible was not just any kind of beautiful decorative object. It had to have certain functional properties, such as the security of being wearable on the person, compactness for hiding or burial, and unforgeable costliness. That costliness must have been verifiable by the recipient of the transfer – using many of the same skills that collectors use to appraise collectibles today.

The theories presented in this paper can be tested by looking for these characteristics (or the lack of them) in the "valuables" often exchanged in these cultures, by examining the economic gains from the cycles through which these valuables move, and by observing preferences for objects with these characteristics in a wide variety of cultures (including modern ones).

With its unprecedented technology of cooperation, humans had become the most fearsome predator ever seen on the planet. They adapted to a shifting climate, while dozens of their large herd prey were driven, by hunting and climate change in America, Europe, and Asia, to extinction. Today, most large animals on the planet are afraid of projectiles – an adaption to only one species of predator [R97]. Cultures based more on gathering than hunting also greatly benefitted. A population explosion followed – *Homo sapiens sapiens* was able to populate more parts of the planet and at a density over ten times that of *Homo sapiens neanderthalensis* [C94], despite weaker bones and no increase in brain size. Much of this increase may be attributed to the social institutions made possible by effective wealth transfer and language – trade, marriage, inheritance, tribute, collateral, and the ability to assess damages to dampen cycles of vengeance.

Primitive money was not modern money as we know it. It took on some of the function modern money now performs, but its form was that of heirlooms, jewelry, and other collectibles. The use of these is so ancient that the desires to explore, collect, make, display, appraise, carefully store, and trade collectibles are human universals – to some extent instincts. This constellation of human desires might be called the collecting instinct. Searching for the raw materials, such as shells and teeth, and manufacturing of collectibles took up a considerable portion of many ancient humans' time, just as many modern humans expend substantial resources on these activities as hobbies. The results for our ancient forebears were the first secure forms of embodied value very different from concrete utility – and the forerunner of today's money.

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